Application Analysis of Logistics Data Management Platform Based on Distribution Transformer Monitoring System

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Keywords: Internet of Things; RFID tag; Logistics management; Intelligent logistics; Navigation system

Abstract: In view of the fact that the logistics based on the Internet of Things is gradually moving towards the era of big data, a logistics management system based on the Internet of Things is designed. With the Internet of Things as the basic hardware support, logistics data is collected by RFID tags, and uploaded to the server through wireless network. Using C# language to develop the system, and combining with GPS navigation system to track and monitor the logistics vehicles in real time, the communication between people and goods, goods and vehicles, goods and goods in logistics transportation is completed, and the intelligent management of logistics is realized.

1. Introduction

With the development of Internet of Things technology, the traditional logistics industry has begun to develop in the direction of intelligence and informatization. Through the modern Internet of Things technology, it monitors the transport conditions and state which are difficult to know in the traditional logistics, so as to better meet the needs of users. For example, in the transportation of fresh food, with the help of Internet of Things technology, data such as temperature, humidity and location in the transport logistics vehicle can be collected and transmitted in real time, so that users can know the transportation status of fresh food at the first time when receiving food, so as to achieve the purpose of reassuring consumption [1]. Through this intelligent way, the service level of logistics industry has been greatly improved. Therefore, this paper designs a logistics management system based on the Internet of Things, aiming at continuously improving the service level of logistics management enterprises by strengthening the whole process monitoring of logistics management.

2. Design purpose and principle of system

The logistics management system based on the Internet of Things designed in this paper is to provide personalized logistics services for different consumers with logistics enterprises as the main body. As a real-time monitoring and management system, in addition to meeting the basic functional requirements in the design, the practicability, maintainability and scalability of the system must also be properly considered. That is to say, the functional design meets the user's needs, the software and hardware are appropriate, and the functions can be expanded timely according to the customer's needs. Therefore, according to the above principles, the functional design of logistics management system based on the Internet of Things can fully meet the basic needs of users, and can realize the management of the whole process of logistics loading and unloading, distribution, warehousing, so as to provide more convenient, fast and safe logistics services for consumers; to adapt to future functional requirements, it can support the secondary development of the system and reserve relevant information. Functional interface to meet future system performance requirements. The development of the system must consider the cost of maintenance, and facilitate the backup and recovery of data, so as to improve the maintainability of data.

  DOI: 10.25236/isrme.2019.105

3. System Architecture Design Based on Internet of Things

The purpose of this system is to realize the real-time management of logistics distribution by logistics enterprises, and to provide real-time inquiry information for consumers. Therefore, combined with the Internet of Things technology [3-5], the system architecture is divided into presentation layer, network layer, business layer and data layer. Among them, the presentation layer mainly provides the interaction interface between the system and the user, so as to realize the tracking, positioning, management and monitoring of goods, including terminal data acquisition equipment, information management system interface, etc. The network layer mainly achieves unified access to system resources through the Internet, wireless communication network and local area network; the service layer mainly encapsulates different business functions. In this system, the presentation layer also acts as the data acquisition layer of the system, collecting the data of goods and vehicles through intelligent vehicle terminal, RFID tags, etc., such as GPS satellite navigation and positioning to monitor the logistics vehicle transportation; the data layer collects the data from the monitoring through RFID, and uploads it to the server for convenience. Customers inquire about the status of cargo transportation (such as temperature, humidity, pressure, etc.).

4. System Function Design

Combining with the business process of logistics transportation, the design of system function is mainly based on the business process of logistics distribution and different roles. For example, real-time information inquiry of goods mainly provides information for customers and freight transport departments to facilitate real-time understanding of the dynamics of freight transport; goods warehousing management departments mainly use the entry and exit of goods; basic information management module mainly provides basic information input, deletion and modification for logistics management departments, while completing the input, modification and deletion of information such as partners, customers, etc. The user of system management module is administrator. The administrator is mainly responsible for the management of the system data and the allocation of the system's role and authority; the vehicle scheduling and route optimization are mainly used by the logistics and Distribution Department for the supervision of the distribution process.

5 Main Function Design of System

5.1 Data Acquisition Design of Goods Status

The state of goods mainly includes environmental temperature, humidity, pressure and other information during transportation. In this paper, the RFID tag with infinite sensor function is selected to collect the status information of goods. The RFID tag contains the information of temperature, humidity, price, destination and quantity of goods. Reader is the focus of goods information acquisition. As can be seen from the diagram, the acquisition system consists of radio frequency channel module and control processing module. The radio frequency channel module mainly sends the hardware structure design of command-sending reader to the RFID tag, receives the tag data collected by the RFID, and sends the data to the control module. The control processing module is mainly responsible for the received signal. Decode and transmit the processed results to the intelligent unit. In the intelligent unit, the embedded MPU control program is used to realize the data interactive connection with different applications in the background.

5.2 Design of Vehicle Location Acquisition

The acquisition of vehicle positioning is mainly based on the principle of GPS navigation system, that is, the instantaneous position of high-speed moving satellite is used as known data to determine the specific position of the point to be measured. The principle of GPS positioning assumes that a GPS receiver is installed on the logistics distribution vehicle in motion, and the location of the distribution vehicle can be obtained by the time t when the satellite sends the signal to the receiver and the historical data of the four satellites. 。 (x1-x) 2 + (y1-y) 2 + (y1-x) 2 + (y1-y) 2 + (z1-z) 2 + C (Vt1-Vt 0) =d1 (1) (x 2-x) 2 + (y2-y) 2 + (z2-z) 2 + (z2-z) 2 + C (Vt2-Vt0) =d2 (2) (x3-x) 2 + (y3-x) 2 + (y3-y3-y) 2 + (z3-z z) 2 + (z3-z) 2 + C (Vt3-z (Vt3-3-z 2 + (Vt3-Vt3-Vt3-Vt3-Vt0) +c (Vt3 (3 (3 (3) 3 (x4 In formula Vt 0) = D4 (4), x, y and Z are the coordinates of the vehicle to be obtained; Vt 0 is the velocity of the vehicle; C is the velocity of the satellite signal; and the other parameters are the known coordinates and velocity of the satellite.

5.3 Distribution Route Optimization Algorithms Design

The traditional shortest path algorithm (Dijkstra algorithm) is widely used in the optimal distribution route, but the query takes a long time. Therefore, an improved shortest path algorithm is proposed. Based on the traditional Dijkstra algorithm, an improved binary sorting tree algorithm based on rectangular restricted region is introduced to shorten the data query time. The specific process is as follows:

1) Load the user's basic information, including starting point A, end point B, obstacle point and transit point. Assume that the overall area of the GIS map is S, starting point coordinates and ending point coordinates are (x1, y1), (x2, y2) respectively. Assume x1x2. According to the Euclidean distance formula, dAB is used as diameter and circular C1 is used to get the area of the circle. Let the circular equation FC1 of circle C1 be:

2) Order that if lambda is greater than or equal to_ (_is a constant less than 1, determined by the map itself), then proceed to step 4; if lambda_, the search is suspended.

3) If the shortest path is not found, the diameter will be expanded to beta dAB, where beta > 1, the search will be carried out again, and go to step 2.

4) Bi represents the point directly connected with A, from which the angle between ABi and AB is solved. If the angle is less than 90 degrees, Bi is put into the shortest path location range, otherwise the next node is calculated.

5) Ai represents the point directly connected with B. The angle between AiB and AB is also calculated. If the angle is less than 90 degrees, Ai is put into the shortest path location range.

6) Repeat steps 4 and 5 until the above two sets intersect to determine the optimal subset of the algorithm.

7) Dijkstra algorithm is used to solve the distance between starting point A and each point, and when B is calculated, the optimal path is output.

6. Conclusion

According to the current demand of intelligent logistics management, this paper develops a logistics management system which can monitor the whole process of logistics distribution by using GPS positioning navigation + RFID tag + C# language, thus providing a reference for the in-depth application of Internet of Things technology. At the same time, the information system also provides a data base for the subsequent large data analysis.

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